DSHS **Name**_____

Physical Science **Period**_____

Lighting a Light Bulb

Materials List

Light bulb, battery, 2 wires, beaker, distilled water, salt (NaCl), gas spectrum tube and power source.

Pre-Activity Questions:

1. In your own words, define electricity:

2. List 3 different sources that electricity can come from:

a) b) c)

3. Think about an electrical outlet at your house, is electricity flowing from it at all times? What must be true for electricity to move from the outlet to a lamp or your garbage disposal? (Try to come up with 2 things)

Activity:

1. Set up a simple circuit using a battery, bulb and 1 wire. (**NEVER connect a wire from the battery to the battery without something in between such as a light bulb!!**) An example of a simple circuit is shown below:

1a. Look closely at the wire that is connecting the battery to the light bulb, what do you suspect that it is made of? (Choices: Gold, Sulfur, Copper or Oxygen?)

1b.Is this considered a metal or a non-metal?

1c. Conductors are materials that allow for electrons to flow through them easily, insulators are materials that do not allow electrons to flow through them easily. If electricity is power produced by the movement of electrons and electricity is required for the light bulb to light up, is the wire considered a conductor or an insulator?

1d. At what point did the light bulb actually light up? What was required for the bulb to light?

2. Set up a beaker with a solution of table salt dissolved in distilled water. Use a conductivity meter to set up a simple circuit. The conductivity meter already has the small light bulb connected to the battery but the simple circuit is open at the bottom. When a conductor connects the two wires, the circuit will be considered closed. The lights bulb will light green to show strong electrical current. An example of this circuit is shown to the left:

2a. If one wire is taken out of the solution, what happens to the light bulb?

Any circuit, which is not complete, is considered an open circuit and electricity will not flow through it. A circuit is considered closed when electricity flows from an energy source to the desired endpoint of the circuit. [A

complete circuit, which is not performing any actual work, can still be a closed circuit. For example, a circuit connected to a dead battery may not perform any work, but it is still a closed circuit.]

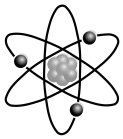
2b. If both wires are in the NaCl solution, is the circuit open or closed? How do you know?

3. **See your instructor for this!!** Observe a gas spectrum tube with power source.

3a. Before the tube is lit, what appears to inside of the tube?

3b. What is actually inside of the tube? [ASK YOUR INSTRUCTOR!]

3c. How is it possible that light is produced when the bulb is connected to a power source? [Read below]



Every substance involved is made of atoms. Atoms are the smallest unit of matter and a made up of a nucleus which contains protons (positively charged) & neutrons, and the nucleus is surrounded by electrons (negatively charged). Some atoms hold their electrons very loosely and allow for the flow of electricity as the electrons can move. When electrons gain energy (in this case being connected to high voltage electricity allows them to gain energy) they jump far away from the atoms nucleus, when they return to their original location, they lose energy in the form of light!!

Post-Activity Questions

1. What is/are the similarity/ies between the three situations/materials? [Think about the set up of the circuits and the composition of the materials!!]

2. a) Why does the light bulb go out if we disconnect the wire from the battery or the bulb?

b) Why does the system not work if we have the wire connected between the bulb and battery in a linear design? [See picture to the left]

3. Based on your answers to question #2, what does this mean about the circuit? (Should it be a continuous loop or not?)

4a. When a wire or light bulb is connected to a battery, there is evidence something is happening, what is this evidence?

4b. Something is “moving” in each system that ultimately results in the lighting of the bulb/tube, what is moving?